

〈Regular Article〉

## Mental health, mental fatigue and breast cancer screening examination behavior in adult women

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**ABSTRACT** Breast cancer has attracted increasing attention recently, because the number of breast cancer patients has increased, and breast cancer has affected some famous people. In Japan, however, the rate of screening examinations for breast cancer remains low and has shown little increase. Various innovations have been introduced to raise the examination rate, but the existence of some kinds of psychosocial problems in examinees may be one reason for the limited effect of these efforts. Here we report a study on the mental health and mental fatigue level of adult women that could affect their behavior of undergoing examinations.

Questionnaires on breast cancer screening examination behavior were distributed to 5,321 adult women from March to September 2014, and responses were obtained from 1,752 (32.9%). After excluding women under 40 years old and questionnaires with clearly inadequate responses, the subjects of the investigation were 1,047 women.

Past experience of undergoing breast cancer screening and levels of mental health and mental fatigue using the WHO subjective well-being inventory (SUBI) were investigated. The SUBI consists of two scales for positive affect and negative affect that make up subjective well-being, with 11 subscales (General Well-Being Positive Affect, Expectation-Achievement Congruence, Confidence in Coping, Transcendence, Family Group Support, Social Support, Primary Group Concern, Inadequate Mental Mastery, Perceived Ill-Health, Deficiency in Social Contacts, and General Well-Being Negative Affect). It is used to assess levels of mental health and mental fatigue.

802 people ( $51.6 \pm 7.97$ ) had undergone examinations in the past, and 245 ( $49.3 \pm 7.29$  years old) had not. The group that had never undergone examinations tended to be significantly younger ( $P < 0.0001$ ). The score for mental health level was significantly higher in the group that had undergone examinations ( $P = 0.013$ ), but no significant difference was seen in mental fatigue level ( $P = 0.847$ ). Subjects with poor mental health (score  $< 31$ ) were significantly less

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likely to undergo screening examinations (odds ratio (OR) 1.61, 95% confidence interval (CI) 1.112-2.331,  $P = 0.012$ ). The results of a multivariate analysis of the 11 subscales showed trends of women being less likely to undergo screening examinations with higher scores for Confidence in Coping (OR 1.175, 95% CI 1.026-1.346,  $P = 0.019$ ), and more likely to undergo screening examinations with higher scores for Family Group Support (OR 0.872, 95% CI 0.777-0.979,  $P = 0.020$ ).

Low mental health level was found to be an impediment to the behavior of undergoing breast cancer screening examinations. Among the mental health items, family support and excessive confidence affected the behavior of undergoing examinations. Thus, approaches that raise mental health with that in mind are thought to be necessary.

doi:10.11482/KMJ-E44(2)61 (Accepted on Nov 27, 2018)

Key words : Screening, behavior of examinations, mental health, WHO SUBI, breast cancer

## INTRODUCTION

Breast cancer has the highest incidence among malignant tumors in Japanese women; it is said to occur in about 90,000 women each year in Japan<sup>1)</sup>. Although breast cancer screening is reported to be effective in reducing the breast cancer mortality rate<sup>2)</sup>, a 2016 basic survey on medical screening showed that, when the examination period for women aged  $\geq 40$  years old is taken to be the previous 2 years, the breast cancer examination rate in Japan is 44.9%, far from the target value of 50%. This is a considerably lower level than the examination rate in developed western countries<sup>3)</sup>.

To raise the examination rate, factors inhibiting the behavior of undergoing screening examinations in Japanese women need to be elucidated, and the main factors need to be resolved.

Previous measures to raise the screening examination rate have included distribution of screening notebooks, educational activities such as public lectures, and free coupons, but these measures have not led to continuous increases in the examination rate. Individual psychosocial aspects may be factors that affect the behavior of undergoing examinations.

We investigated the relationship between the behavior of undergoing breast cancer screening examinations and psychosocial factors in Japanese

women.

## METHODS

*1. Subjects and methods:* A questionnaire survey on adult women's behavior with regard to undergoing breast cancer screening examinations was distributed to 5,321 women in 24 institutions in three prefectures from March to September of 2014. Anonymous questionnaires were collected by mail from 1,752 women (32.9%). After excluding women under 40 years old and questionnaires with clearly inadequate responses, the investigation was conducted with 1,047 women.

### *2. Survey items*

For experience of screening by mammography or palpation, responses were obtained with the use of the WHO subjective well-being inventory (SUBI)<sup>4)</sup> Japanese version<sup>5)</sup> in relation to whether or not subjects had undergone screening examinations in the past and psychosocial factors. Subject background factors including age, marital status, presence of children, family structure, occupation pattern, annual household income, and family history were similarly surveyed.

### *3. WHO SUBI*

The WHO SUBI consists of two scales for positive

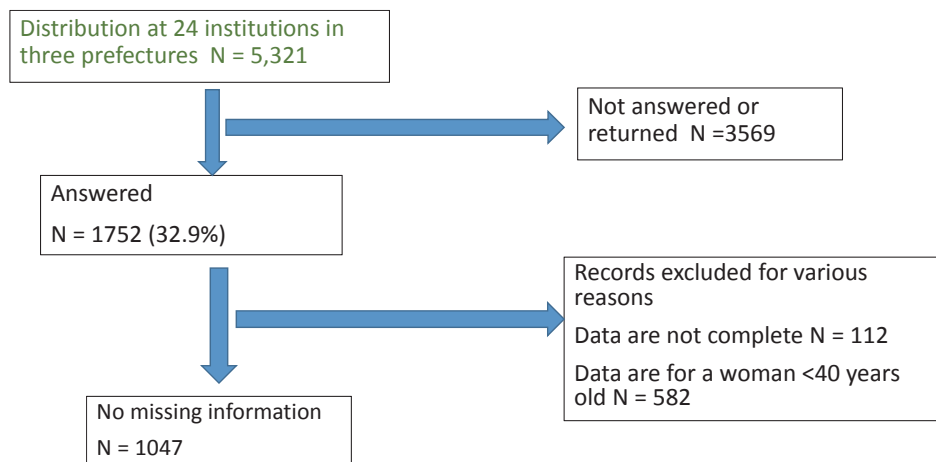


Fig. 1. flow chart of subjects

affect and negative affect that make up subjective well-being. It is a self-completed questionnaire that can evaluate not only mental health status but also comprehensively assess mental life, including human relationships and the individual's view of her physical health.

SUBI has 40 questionnaires and respondents select a response for each from one of the following 3 scores: very much, to extent and not so much. The points were totaled for the 19 items of mental health levels and 21 items of mental fatigue levels.

It assesses mental health and mental fatigue levels from 11 subscales (General Well-Being Positive Affect, Expectation-Achievement Congruence, Confidence in Coping, Transcendence, Family Group Support, Social Support, Primary Group Concern, Inadequate Mental Mastery, Perceived Ill-Health, Deficiency in Social Contacts, and General Well-Being Negative Affect).

Regarding subscales, higher scores indicate a better sense of well-being.

The SUBI has cut-off values of 42 and 31 points for mental health levels, with scores of 42 or more considered to indicate a high mental health levels and scores below 31 to indicate a low mental health levels. The cut-off values for mental fatigue are 48 and 43 points, with scores below 48 indicating

considerable mental fatigue levels and scores below 43 in particular indicating the need for attention.

For these question items, permission for the use of WHO SUBI questions was obtained from the WHO SUBI publisher in Japan, Kanekoshobo<sup>5)</sup>.

#### 4. Analysis

A t-test was used to analyze whether or not subjects had undergone examinations in the past, the mental health levels and mental fatigue levels obtained with SUBI, and the 11 subscales. An age-adjusted logistic analysis was also done for whether levels of mental health and mental fatigue affected behavior of undergoing examinations. The level of statistical significance was taken to be a p value of less than 0.05. IBM SPSS ver. 23 was used in the statistical analysis.

#### 5. Ethical considerations

This study was approved by the research ethics committee at the principal investigator's university. Requests for cooperation in the study and consent were made to each institution in accordance with the ethical procedures for research at each cooperating institution, and approval and consent were obtained from the heads of the institutions.

A written explanation describing ethical

Table 1. Characteristics of the study population

		Have undergone screening examinations N = 802		Have not undergone screening examinations N = 245	
Age (years)		51.6 ± 7.97		49.3 ± 7.29	
Marital status	Married	641	80.8%	177	73.4%
	Unmarried	53	6.7%	28	11.6%
	Divorced/ widowed	99	12.5%	36	14.9%
Presence of children	Yes	712	89.4%	207	85.2%
	No	84	10.6%	36	14.8%
Family structure	Live alone	51	6.4%	22	9.0%
	Live with spouse only	146	18.3%	24	9.8%
	Nuclear family with spouse and children	262	32.8%	84	34.4%
	Parents and nuclear family	47	5.9%	23	9.4%
	Three generations	180	22.5%	51	20.9%
	Other	114	14.2%	40	16.4%
Occupation	Professional	418	52.7%	133	55.6%
	Managerial	40	5.0%	14	5.9%
	General office work	99	12.5%	30	12.6%
	Technical work	32	4.0%	11	4.6%
	Self-employed	15	1.9%	3	1.3%
	Homemaker	85	10.7%	14	5.9%
	Other	104	13.1%	34	14.2%

		Have undergone screening examinations		Have not undergone screening examinations	
Work pattern	Full time	541	68.1%	184	76.7%
	Part time	173	21.8%	49	20.4%
	Unemployed (including full-time homemaker)	37	4.7%	3	1.3%
	On leave	2	0.3%	0	0%
	Retired	24	3.0%	1	0.4%
	Other	17	2.1%	3	1.3%
Final education	Junior high school	19	2.4%	5	2.0%
	High school	211	26.5%	72	29.5%
	Vocational school	316	39.7%	121	49.6%
	Junior college	171	21.5%	36	14.8%
	University	67	8.4%	6	2.5%
	Graduate school	9	1.1%	1	0.4%
	Other	3	0.4%	3	1.2%
Annual household income	≤2.99 million yen	124	16.1%	40	17.2%
	3.00-4.99 million yen	207	26.8%	66	28.4%
	5.00-7.99 million yen	264	34.2%	88	37.9%
	8.00-9.99 million yen	88	11.4%	24	10.3%
	10.00-14.99 million yen	79	10.2%	12	5.2%
	≥15.00 million yen	9	1.2%	2	0.9%
Family history	Yes	233	29.1%	51	21.0%

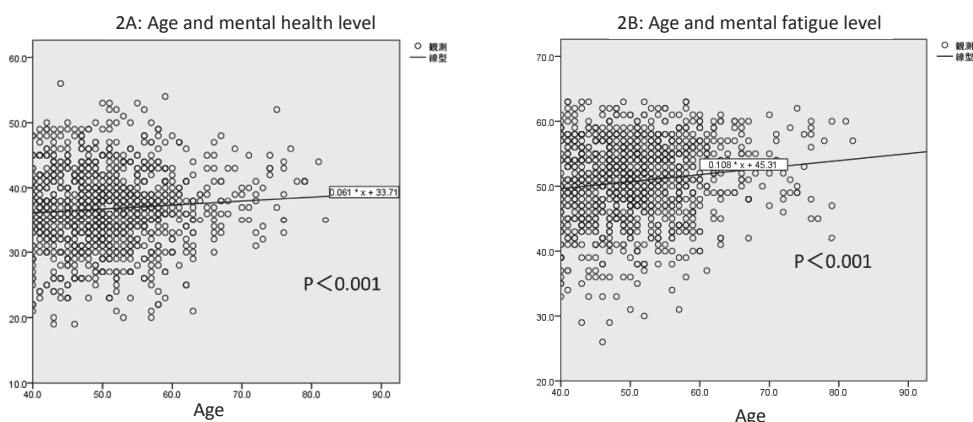


Fig. 2. Correlation between age and mental health level/fatigue level

considerations such as the purpose of the study, that cooperation was voluntary, and that the study would be conducted anonymously was sent together with the questionnaire form and a return envelope to individual subjects. Requests for direct (handwritten) responses to the questionnaire were made only to people from whom consent for the study was obtained. They were asked to anonymously submit the questionnaire addressed to the institution of the principal researcher by mail.

## RESULTS

A summary of the 1,047 subjects in this study is shown in Table 1. The group that had undergone examinations consisted of 802 people (51.6 ± 7.97 years old), and the group that had never undergone examinations consisted of 245 people (49.3 ± 7.29 years old). The group that had never undergone screening examinations tended to be significantly younger ( $P < 0.0001$ ). Fig. 2 shows whether age affected mental health and fatigue. As age increased, the mental health level became

Table 2. Comparison of average scores for Mental health levels/Mental fatigue levels and the 11 SUBI subscales

	Screened		Not screened		P Value
	Mean	SD	Mean	SD	
<b>I</b>					
<b>Mental health levels</b>	37.09	6.01	35.97	6.69	<b>0.013</b>
<b>Mental fatigue levels</b>	50.85	6.03	50.76	6.91	0.847
<b>II</b>					
General Well-Being Positive Affect	5.815	1.32	5.604	1.41	<b>0.038</b>
Expectation Achievement Congruence	5.638	1.21	5.420	1.31	<b>0.021</b>
Confidence in Coping	5.779	1.34	5.869	1.40	0.362
Transcendence	5.349	1.23	5.179	1.28	0.082
Family Group Support	6.382	1.55	5.996	1.70	<b>0.001</b>
Social Support	5.903	1.55	5.731	1.71	0.137
Primary Group Concern	7.266	1.25	7.127	1.29	0.160
Inadequate Mental Mastery	15.99	2.95	16.19	3.22	0.366
Perceived Ill Health	14.50	1.99	14.52	2.18	0.893
Deficiency in Social Contacts	7.789	1.10	7.722	1.19	0.414
General Well-being Negative Affect	7.532	1.26	7.359	1.40	0.084

Table 3. Relationship among mental health, fatigue degree, and consultation behaviors

	Odds ratio	95% confidence interval	P Value
<b>SUBI: Mental health levels</b>			
(good mental health points rate) Cut-off value 42	1.173	0.822-1.672	0.379
(poor mental health rate) Cut-off value 31	<b>1.610</b>	<b>1.112-2.331</b>	<b>0.012</b>
<b>SUBI: Mental fatigue levels</b>			
(poor mental fatigue points rate) Cut-off value 48	0.817	0.586-1.138	0.232
(severely poor mental fatigue rate) Cut-off value 43	1.449	0.929-2.260	0.102

Age-adjusted

higher ( $Y = 0.061x + 33.71$ ,  $P < 0.001$ ), and the mental fatigue level became lower ( $Y = 0.108x + 45.31$ ,  $P < 0.001$ ). The results of a t-test for the mental health and mental fatigue levels obtained with SUBI and the 11 subscales between the two groups of women who had and had not undergone screening examinations are shown in Table 2. The mental health level score was significantly higher in the group that had undergone examinations ( $P = 0.013$ ), but no significant difference was seen in the mental fatigue level ( $P = 0.847$ ). Of the 11 subscales, the scores for the three items of General Well-Being Positive Affect, Expectation-

Achievement Congruence, and Family Group Support were significantly higher in the group that had undergone screening examinations. The risk of not being screened when levels of mental health and mental fatigue were specified using cut-off values is shown in Table 3. When mental health was poor, there was a significant trend to not undergo examinations (odds ratio (OR) 1.61, 95% confidence interval (CI) 1.112-2.331,  $P = 0.012$ ). The results of a univariate logistic analysis on the relationship of behavior of undergoing screening examinations and mental health and fatigue levels are shown in Table 4. Higher scores on the items of

Table 4. the relationship of behavior of undergoing screening examinations and mental health and fatigue levels (Univariate analysis)

	Not screened					
	Unadjusted odds ratio	95%CI	P Value	Age adjusted odds ratio	95%CI	P Value
<b>SUBI: Mental health level</b>	0.971	(0.949-0.994)	<b>0.013</b>	0.974	(0.952-0.997)	<b>0.029</b>
<b>SUBI: Mental Fatigue level</b>	0.998	(0.975-1.021)	0.835	1.004	(0.981-1.028)	0.726
General Well-Being Positive Affect	0.890	(0.800-0.990)	<b>0.032</b>	0.899	(0.809-1.00)	<b>0.050</b>
Expectation Achievement Congruence	0.867	(0.772-0.973)	<b>0.016</b>	0.882	(0.785-0.991)	<b>0.035</b>
Confidence in Coping	1.051	(0.945-1.168)	0.362	1.062	(0.955-1.181)	0.266
Transcendence	0.902	(0.802-1.013)	0.083	0.930	(0.827-1.047)	0.230
Family Group Support	0.859	(0.785-0.940)	<b>0.001</b>	0.860	(0.786-0.942)	<b>0.001</b>
Social Support	0.934	(0.853-1.022)	0.138	0.935	(0.853-1.024)	0.147
Primary Group Concern	0.917	(0.819-1.026)	0.130	0.924	(0.825-1.035)	0.173
Inadequate Mental Mastery	1.022	(0.974-1.073)	0.365	1.038	1.038 (0.988-1.090)	0.136
Perceived Ill Health	1.005	(0.937-1.078)	0.893	1.009	1.009 (0.940-1.083)	0.802
Deficiency in Social Contacts	0.949	(0.836-1.076)	0.414	0.986	0.986 (0.867-1.121)	0.825
General Well-being Negative Affect	0.905	(0.812-1.007)	0.067	0.932	0.932 (0.836-1.040)	0.208

Table 5. The results of a multivariate analysis with the 11 subscales

	Unadjusted odds ratio	95% confidence interval	P Value	Age adjusted odds ratio	95% confidence interval	P Value
General Well-Being Positive Affect	0.973	(0.837-1.131)	0.725	0.961	(0.827-1.117)	0.602
Expectation Achievement Congruence	0.879	(0.760-1.017)	0.082	0.881	(0.761-1.020)	0.089
Confidence in Coping	<b>1.189</b>	<b>(1.039-1.361)</b>	<b>0.012</b>	<b>1.175</b>	<b>(1.026-1.346)</b>	<b>0.019</b>
Transcendence	0.969	(0.832-1.128)	0.687	1.010	(0.866-1.177)	0.899
<b>Family Group Support</b>	<b>0.876</b>	<b>(0.781-0.983)</b>	<b>0.025</b>	<b>0.872</b>	<b>(0.777-0.979)</b>	<b>0.020</b>
Social Support	0.998	(0.893-1.115)	0.965	0.988	(0.883-1.105)	0.832
Primary Group Concern	0.996	(0.859-1.156)	0.961	0.977	(0.840-1.137)	0.767
Inadequate Mental Mastery	1.049	(0.984-1.119)	0.141	1.061	(0.994-1.132)	0.075
Perceived Ill Health	1.018	(0.939-1.103)	0.667	1.009	(0.931-1.095)	0.821
Deficiency in Social Contacts	0.929	(0.800-1.079)	0.332	0.955	(0.820-1.111)	0.548
General Well-being Negative Affect	0.915	(0.785-1.067)	0.258	0.938	(0.803-1.096)	0.420

General Well-Being Positive Affect, Expectation-Achievement Congruence, and Family Group Support were associated with a tendency to undergo examinations. The results of a multivariate analysis on the relationship of behavior of undergoing screening examinations and 11 subscales are shown in Table 5. Higher scores for Confidence in Coping were associated with a lower likelihood of undergoing screening examinations (OR 1.175, 95% CI 1.026-1.346,  $P = 0.019$ ), whereas higher scores for Family Group Support were associated with a

higher likelihood of screening examinations (OR 0.872, 95% CI 0.777-0.979,  $P = 0.020$ ). There were no significant differences in a multivariate analysis for the items of General Well-Being Positive Affect and Expectation-Achievement Congruence, which had shown significant differences with univariate analyses.

## DISCUSSION

### 1: Mental health levels and Mental fatigue levels

The breast cancer screening examination rate

in Japan is clearly lower than in other developed countries of the world<sup>3)</sup>. The living standard in Japan, in terms of the economy, society, and infrastructure, is no lower than in other developed countries. Local and national governments have made efforts to raise the screening examination rate, but those efforts have not been effective. In this study, we elucidated the psychosocial factors of Japanese women that affect their behavior of undergoing screening examinations.

With regard to psychiatric disease and behavior of undergoing screening examinations, several reports have shown that the screening examination rate is low in women with severe psychiatric disorders<sup>7)</sup>. However, we could not find a similar study for general women. In this study, we conducted a questionnaire survey on a wide range of women thought to be healthy without any particular attention to patients with psychiatric disease. Even among women thought to be healthy, there was a huge variation in mental health and fatigue, indicating the complexity of psychological responses.

In this study, the mental health level was more important than the mental fatigue level in hindering people from undergoing screening examinations, and special attention is thought to be needed when mental health is particularly low.

In cases of a conspicuously low mental health levels, factors that inhibit behaviors of screening examinations are associated with risks not only for not undergoing breast cancer screening but also for other diseases including mental diseases such as schizophrenia and depression, and so appropriate evaluation and improvement of the mental health level and mental fatigue level are desirable.

In this study, younger ages were also shown to have lower levels of mental health and fatigue. According to Ministry of Health, Labour and Welfare in Japan women in their 30s in particular are reported to have the greatest mental instability<sup>8)</sup>.

American Cancer Society Recommends that women in average risk asymptomatic adults should have the opportunity to begin annual screening between ages 40 and 44 y<sup>9)</sup>. It may be necessary to consider support from an early stage to improve mental health and create an environment in which women can live as planned without undue pressure.

A new point of focus in this study was the evaluation using a more objective indicator, the WHO SUBI, and the analysis of the 11 subscales. Higher Family Group Support scores led to a greater likelihood of undergoing screening examinations. Put another way, attempts to make it easier for women who do not have family support to get screened may be important to increase the examination rate.

There was also a tendency for women with high scores for Expectation-Achievement Congruence to be more likely to undergo screening examinations.

We consider that it is necessary to conduct multivariate analysis, as it is probable that mutual confounding factors exist for indicators of positive emotions or negative emotions. Interestingly, in the multivariate analysis, there was a tendency for high Confidence in Coping to be associated with not being examined. Past reports have also stated that women with a strong mental state are in fact less likely to get a screening examination<sup>10)</sup>. There is concern that excessive confidence in one's health will result in not getting a screening examination, and in cases when there are effects from such factors, it may be necessary to provide proper knowledge and information so that the person understands the importance of breast cancer screening.

Breast cancer screening is reported to be an effective means of reducing mortality in other countries<sup>11-13)</sup>. The peak age for the occurrence of breast cancer in Japan is the late 40s to 60s. This is a generation that plays a fundamental role in society, and so efforts to raise the screening examination rate

may also be beneficial economically. Consequently, it may be necessary to create systems including those that involve the government for women who do not receive family support.

## CONCLUSION

A low mental health level was found to be an impediment to the behavior of undergoing breast cancer screening examinations. Among mental health items, family support and excessive confidence affected examination behavior, and so approaches that improve mental health with that in mind are thought to be necessary.

## ACKNOWLEDGMENTS

The authors are grateful to Prof. Kazuya Yamashita, Vice President of the University of Shimane, Prof. Masaharu Mori, formerly of the Faculty of Health and Welfare Science, Okayama Prefectural University, and Prof. Chikako Kakehashi of the University of Shimane for their generous support in carrying out this study.

We would also like to express our deep gratitude to the many subjects for their willing cooperation in the survey.

## REFERENCES

- 1) Center for Cancer Control and Information Services, National cancer Center, Japan. [https://ganjoho.jp/reg\\_stat/statistics/de/index.html](https://ganjoho.jp/reg_stat/statistics/de/index.html) (2018. 10. 1)
- 2) Myers ER, Moorman P, Gierisch JM, *et al.*: Benefits and Harms of Breast Cancer Screening: A Systematic Review. *JAMA*. 314: 1615-1634, 2015.
- 3) OECD Health Statistics 2017  
<http://www.oecd.org/health/health-at-a-glance.htm> (2018. 10. 1)
- 4) Nagpal R, Sell H. Assessment of subjective well-being: inventory(SUBI). New Delhi: Regional Office for South-East Asia, World Health Organization. 1992
- 5) Ono Y, Yoshimura K. Guidebook of WHO SUBI. Kaneko Shobo 2001 (in Japanese)
- 6) Ministry of Health, Labour and Welfare, Japan.  
[http://www.mhlw.go.jp/common/images/base/header\\_logo\\_mhlw.png](http://www.mhlw.go.jp/common/images/base/header_logo_mhlw.png) (2018. 10. 1)
- 7) Woodhead C, Cunningham R, Ashworth M, Barley E, Stewart RJ, Henderson MJ. Cervical and breast cancer screening uptake among women with serious mental illness: a data linkage study. *BMC Cancer*. 16: 819, 2016.
- 8) Ministry of Health, Labour and Welfare, Japan. [http://www.mhlw.go.jp/common/images/base/header\\_logo\\_mhlw.png](http://www.mhlw.go.jp/common/images/base/header_logo_mhlw.png) (2018. 10. 1)
- 9) Smith RA, Andrews KS, Brooks D, Fedewa SA, Manassaram-Baptiste D, Saslow D, Brawley OW, Wender RC. Cancer screening in the United States, 2017: A review of current American Cancer Society guidelines and current issues in cancer screening. *CA Cancer J Clin*. 67: 100-121, 2017.
- 10) Jensen LF, Pedersen AF, Andersen B, Vedsted P. Self-assessed health, perceived stress and non-participation in breast cancer screening: A Danish cohort study. *Prev Med*. 81: 392-398, 2015. doi: 10.1016/j.ypmed.2015.10.004. Epub 2015 Oct 19.
- 11) Tabár L, Fagerberg CJ, Gad A, *et al.*: Reduction in mortality from breast cancer after mass screening with mammography. Randomised trial from the Breast Cancer Screening Working Group of the Swedish National Board of Health and Welfare. *Lancet* 1: 829-832, 1985.
- 12) U.S. Preventive Services Task Force: Screening for breast cancer: U.S. Preventive Services Task Force recommendation statement. *Ann Intern Med* 151: 716-726 (w-236), 2009
- 13) Woolf SH: The 2009 breast cancer screening recommendations of the US Preventive Services Task Force. *JAMA* 303:162-163, 2010